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Doron Levy

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University of Maryland - College Park
Research Administration
3112 Lee Building
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14. ABSTRACT

The International Conference on "Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs" took place April 28 - May 02, 2014 in Bethesda, MD.

This conference highlighted recent advances and new perspectives in applied analysis and computational mathematics, focusing on theoretical, computational and applied aspects of partial differential equations. The meeting brought together researchers from different disciplines and provided a unique opportunity for in-depth of

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Report Title

Final Report: Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs

ABSTRACT

The International Conference on “Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs” took place April 28 - May 02, 2014 in Bethesda, MD.

This conference highlighted recent advances and new perspectives in applied analysis and computational mathematics, focusing on theoretical, computational and applied aspects of partial differential equations. The meeting brought together researchers from different disciplines and provided a unique opportunity for in-depth of technical discussions and exchange of ideas in all areas involving mathematical and computational sciences, modeling and simulations, as well as their applications.

The specific Aims of the meeting were to: 1.Provide a forum for scientists to share experiences, exchange ideas, and explore new collaborations; 2. Identify “big” problems in application areas that require innovative mathematical approaches; 3. Provide graduate students, postdocs, and early-career professors, to expose their research to senior members of the community.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received Paper

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Post Doctorates

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Faculty Supported

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Under Graduate students supported

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00
The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00
The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00
Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00
Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00
The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00
The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: 0.00

Names of Personnel receiving masters degrees

NAME

Total Number:

Names of personnel receiving PHDs

NAME

Total Number:

Names of other research staff

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

The conference featured approximately 30 invited talks delivered by leading applied mathematicians. The list of speakers included an Abel Prize winner (Peter Lax), a Fields Medalists (Pierre-Louis Lions), the President of Hong Kong University of Science and Technology (Tony Chan), and several members of the National Academy of Sciences (Alexandre Chorin, Andrew Majda, Stanley Osher).
The talks focused on contemporary trends in applied mathematics with special emphasis on open problems providing an outlook to future research directions.

A dedicated webpage was created for the conference.
The URL for the conference webpage is http://www.ki-net.umd.edu/activities/tn60/
The webpage includes
1) list of invited participants (including links to their webpages)
2) titles and abstracts of the talks
3) information about the organizing committee
4) conference program
5) list of participants and their institutions
6) conference logistic information

The attachment includes:
1) The full conference schedule, including links to the abstracts of the talks
2) The list of participants and their institutions

Technology Transfer

Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs
April 28 - May 2, 2014

Monday, April 28

08:00 – 08:45	**REGISTRATION**
MORNING SESSION:	**Chair: Ron DeVore** (Texas A&M University)
08:45 – 09:00	**Mary Ann Rankin** (Senior Vice President and Provost, University of Maryland, College Park) Welcoming Remarks
09:00 – 09:40	**Tony Chan** (Hong Kong University of Science and Technology) Image denoising using mean curvature of image surface
09:45 – 10:25	**Joel Smoller** (University of Michigan) Existence of magnetic compressible fluid stars
10:30 – 11:00	**COFFEE BREAK**
11:00 – 11:40	**Peter Constantin** (Princeton University) Lagrangian goodies: analyticity and uniqueness
11:45 – 12:25	**Shi Jin** (University of Wisconsin-Madison) Semiclassical computational methods for quantum dynamics with band-crossing
12:30 – 02:00	**LUNCH BREAK**
AFTERNOON SESSION:	**Chair: Anne Gelb** (Arizona State University)
02:00 – 02:40	**Pierre Degond** (Imperial College London) Interplay between kinetic theory and game theory
02:45 – 03:25	**Siddhartha Mishra** (ETH Zürich) Entropy and efficient numerical schemes for conservation laws
03:30 – 04:00	**COFFEE BREAK**
04:00 – 04:40	**Blake Temple** (University of California-Davis) A wave mechanism for the anomalous acceleration without dark energy
05:00 – 06:00	**RECEPTION** (hosted by the conference)

Tuesday, April 29

MORNING SESSION:	**Chair: Alina Chertock** (North Carolina State University)
09:00 – 09:40	**Thomas Hou** (California Institute of Technology) Recent progress on the search of 3D Euler singularities
09:45 – 10:25	**Albert Cohen** (Université Pierre et Marie Curie) Estimating the n-width of solution manifolds of parametric PDE's
10:30 – 11:00	**COFFEE BREAK**
11:00 – 11:40	**C. David Levermore** (University of Maryland) Global Maxwellians over all space and their relation to conserved quantities of classical kinetic equations
11:45 – 12:25	**Irene Gamba** (The University of Texas at Austin) Convergence rates for the Boltzmann equation for Coulombic interactions to Landau equation: analysis and simulations
12:30 – 02:00	**LUNCH** (hosted by the conference)
AFTERNOON SESSION:	**Chair: Dany Leviatan** (Tel Aviv University)
02:00 – 02:40	**Claude Bardos** (Université Pierre et Marie Curie) Asymptotic behavior and scattering for solutions of the Boltzmann equation near global Maxwellian
02:45 – 03:25	**Athanasios Tzavaras** (University of Crete) The relative entropy method in hyperbolic and diffusive systems
03:30 – 04:00	**COFFEE BREAK**
04:00 – 04:40	**Tao Tang** (Hong Kong Baptist University) Hermite spectral methods and discrete least square projection with random evaluations

Wednesday, April 30

MORNING SESSION:	**Chair: Doron Levy** (University of Maryland)
09:00 – 09:40	**Pierre-Louis Lions** (Collège de France) On mean field games
09:45 – 10:25	**Andrew Majda** (New York University) Applied math perspectives on stochastic climate models
10:30 – 11:00	**COFFEE BREAK**
11:00 – 11:40	**Alexandre Chorin** (University of California-Berkeley) Computing with uncertainty
11:45 – 12:25	**Stanley Osher** (University of California-Los Angeles) What sparsity and L^1 optimization can do for you
12:30 – 02:00	**LUNCH BREAK**
FREE AFTERNOON	
06:30 – 07:15	**COCKTAIL (*)**
07:15 – 10:00	**CONFERENCE DINNER (*)** **Peter Lax** (New York University) John von Neumann: The Early Years, The Years at Los Alamos and the Road to Computing **(Video of Talk) (Text of Talk)**

(*) La Ferme, 7101 Brookville Road, Chevy Chase, MD

Thursday, May 1

MORNING SESSION:	**Chair: Alexander Kurganov** (Tulane University)
09:00 – 09:40	**François Golse** (Ecole Polytechnique-Paris) A derivation of models for spray flows
09:45 – 10:25	**Gui-Qiang Chen** (University of Oxford) Multidimensional shock waves and free boundary problems
10:30 – 11:00	**COFFEE BREAK**
11:00 – 11:40	**Björn Engquist** (The University of Texas at Austin) Wasserstein metric and Texas oil
11:45 – 12:25	**Jian-Guo Liu** (Duke University) An analysis of merging-splitting group dynamics by Bernstein function theory
12:30 – 02:00	**LUNCH** (hosted by the conference)
AFTERNOON SESSION:	**Chair: Hailiang Liu** (Iowa State University)
02:00 – 02:40	**Pierre-Emmanuel Jabin** (University of Maryland) Regularity estimates for transport equations through "dual norms"
02:45 – 03:25	**Saul Abarbanel** (Tel-Aviv University) The role of pseudo-plane-waves in sound propagation in non-uniform media
03:30 – 04:00	**COFFEE BREAK**
04:00 – 04:40	**Edriss Titi** (The Weizmann Institute and UC Irvine) Finite number of determining parameters for the Navier-Stokes equations with applications into feedback control and data assimilation

Friday, May 2

MORNING SESSION:	**Chair: Radu Balan** (University of Maryland)
09:00 – 09:40	**Endre Süli** (University of Oxford) Existence of global weak solutions to Navier-Stokes-Fokker-Planck systems
09:45 – 10:25	**Helena Lopes** (Universidade Federal do Rio de Janeiro) Boundary correctors and energy estimates for the boundary layer problem
10:30 – 11:00	**COFFEE BREAK**
11:00 – 11:40	**Chi-Wang Shu** (Brown University) Positivity-preserving high order schemes for convection dominated equations
11:45 – 12:25	**José Carrillo** (Imperial College London) Macroscopic and kinetic equations with repulsion-attraction mechanisms: a review
12:30 – 01:00	**CLOSING**

Modern Perspectives in Applied Mathematics: List of Participants

First Name	Last Name	Institution	Invited	Junior	Other	Woman
Sara	Aceituno	University of Cambridge		x		x
Stuart	Antman	Univ. Maryland			x	
Jacob	Bedrossian	University of Maryland		x		
Animikh	Biswas	University of Maryland, Baltimore County			x	
Dana	Botesteanu	University of Maryland		x		x
Maria	Cameron	University of Maryland		x		x
Yuanzhen	Cheng	Tulane University		x		
Shumo	Cui	Tulane University		x		
Matias	Delgadino	University of Maryland		x		
Fabrice	Deluzet	Institute of Mathematics of Toulouse		x		
Boris	Ettinger	Princeton University			x	
Ulrik	Fjordholm	Norwegian University of Science and Technology			x	
Claus	Goetz	University of Hamburg		x		
James	Greene	University of Maryland		x		
Siming	He	University of Maryland, College Park		x		
Jingwei	Hu	The University of Texas at Austin		x		x
Mi-Young	Kim	Inha University			x	x
Qin	Li	California Institute of Technology		x		x
Jeng	Lin	George Mason University			x	
Jing	Liu	Carnegie Mellon University		x		
Liu	Liu	UW-MADISON		x		
Xiangji	Ma	University of Maryland, College Park		x		
Henok	Mawi	Howard University			x	
Rafael	Monteiro da Silva	Indiana University		x		
Akil	Narayan	University of Massachusetts Dartmouth		x		
Enrique	Otarola	University of Maryland		x		
Surya	Prasath	University of Missouri-Columbia		x		
Zhuolin	Qu	Tulane University		x		
Victor	Roytburd	The National Science Foundation		x		
Scott	Smith	University of Maryland		x		
Ivan	Sudakov	the University of Utah		x		
Luyu	Sun	University of Maryland		x		x
Michelle	Tadmor	Columbia University		x		x
Zhenfu	Wang	University of Maryland		x		
Tong	Wu	Tulane University		x		

Modern Perspectives in Applied Mathematics: List of Participants

First Name	Last Name	Institution	Invited	Junior	Other	Woman
Lijiang	Wu	Carnegie Mellon University		x		
Yulong	Xing	Oak Ridge National Laboratory and University of Tennessee		x		
Ling	Xu	Georgia State University		x		x
Yunhua	Xue	Nankai University, University of Mass Dartmouth			x	
Prashant	Athavale	University of Toronto		x		
Hantaek	Bae	University of California, Davis		x		
Radu	Balan	University of Maryland			x	
Jorge	Balbas	California State University, Northridge			x	
Jayanth	Banavar	University of Maryland			x	
Tomek	Bartoszynski	The National Science Foundation			x	
Scott	Boutaugh	University of Maryland			x	
Bin	Cheng	University of Surrey			x	
Alina	Chertock	North Carolina State University			x	x
Ron	DeVore	Texas A&M University			x	
Oleg	Diyankov	NeurOK Software LLC			x	
Nira	Dyn	Tel-Aviv University			x	x
Shlomo	Engelberg	Jerusalem College of Technology			x	
Michael	Fisher	University of Maryland			x	
Mike	Fitzpatrick	University of Maryland			x	
Mark	Freidlin	University of Maryland			x	
Anne	Gelb	Arizona State University			x	x
Sigal	Gottlieb	UMass Dartmouth			x	x
Jeff	Henrikson	University of Maryland			x	
Kayo	Ide	University of Maryland			x	x
Eugenia	Kalnay	University of Maryland			x	x
Trygve	Karper	Norwegian University of Science and Technology		x		
David	Kinderlehrer	Carnegie Mellon University			x	
Alexander	Kurganov	Tulane University			x	
Dany	Leviatan	Tel-Aviv University			x	
Doron	Levy	University of Maryland			x	
Hailiang	Liu	Iowa State University			x	
Maria	Lukacova	UniversitÃ¤t Mainz			x	x
Reza	Malek-Madani	Office of Naval Research			x	
Sebastien	Motsch	Arizona State University		x		
Thomas	Rey	University of Maryland		x		

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First Name	Last Name	Institution	Invited	Junior	Other	Woman
Eitan	Tadmor	University of Maryland	x			
Changhui	Tan	University of Maryland			x	
Junping	Wang	The National Science Foundation			x	
John	Weeks	University of Maryland			x	
Ellen	Williams	BP			x	x
Scott	Wolpert	University of Maryland			x	
Ming	Zhong	University of Maryland		x		
Jing	Zou	Fannie Mae			x	
Saul	Abarbanel	Tel-Aviv University	x			
Claude	Bardos	University Pierre et Marie Curie	x			
Jose	Carrillo	Imperial College London	x			
Tony	Chan	The Hong Kong University of Science & Technology	x			
Gui-Qiang	Chen	University of Oxford	x			
Alexandre	Chorin	University of California-Berkeley	x			
Albert	Cohen	University Pierre et Marie Curie	x			
Peter	Constantin	Princeton University	x			
Pierre	Degond	Imperial College London	x			
Bjorn	Engquist	The University of Texas at Austin	x			
Irene	Gamba	The University of Texas at Austin	x			x
Francois	Golse	Ecole Polytechnique-Paris	x			
Thomas	Hou	California Institute of Technology	x			
Pierre-Emmanuel	Jabin	University of Maryland	x			
Shi	Jin	University of Wisconsin-Madison	x			
Peter	Lax	New York University	x			
C. Dave	Levermore	University of Maryland	x			
Pierre-Louis	Lions	CollÃ¨ge de France	x			
Jian-Guo	Liu	Duke University	x			
Helena	Lopes	Universidade Federal do Rio de Janeiro	x			x
Andrew	Majda	New York University	x			
Siddhartha	Mishra	ETH Zurich	x			
Stanley	Osher	University of California-Los Angeles	x			
Chi-Wang	Shu	Brown University	x			
Joel	Smoller	University of Michigan	x			
Endre	Suli	University of Oxford	x			
Tao	Tang	Hong Kong Baptist University	x			

Modern Perspectives in Applied Mathematics: List of Participants

First Name	Last Name	Institution	Invited	Junior	Other	Woman
Blake	Temple	University of California-Davis	x			
Edriss	Titi	The Weizmann Institute and UC-Irvine	x			
Athanasios	Tzavaras	University of Crete	x			